

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference 21066PCT AWT:MM:KG	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/AU2004/000864	International filing date (day/month/year) 30 June 2004	Priority date (day/month/year) 30 June 2003
International Patent Classification (IPC) or national classification and IPC Int. Cl. <sup>7</sup> C12Q 1/68, C12M 1/34, G01N 33/48, B82B 3/00, G02B 26/02		
Applicant RAUSTECH PTY LTD et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
  - a. ☒ (sent to the applicant and to the International Bureau) a total of 5 sheets, as follows:
    - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
    - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
  - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
 

<input checked="" type="checkbox"/> Box No. I	Basis of the report
<input type="checkbox"/> Box No. II	Priority
<input type="checkbox"/> Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/> Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/> Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/> Box No. VI	Certain documents cited
<input type="checkbox"/> Box No. VII	Certain defects in the international application
<input type="checkbox"/> Box No. VIII	Certain observations on the international application

Date of submission of the demand 29 April 2005	Date of completion of the report 10 May 2005
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer  BAYER MITROVIC Telephone No. (02) 6283 2164

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/AU2004/000864

**Box No. I**      **Basis of the report**

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1 (b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-46 as originally filed/furnished
  - pages\* received by this Authority on with the letter of
  - pages\* received by this Authority on with the letter of
- ☒ the claims:
- pages 47-52 as originally filed/furnished
  - pages\* as amended (together with any statement) under Article 19
  - pages 53-57 received by this Authority on 29 April 2005 with the letter of 29 April 2005
  - pages\* received by this Authority on with the letter of
- ☒ the drawings:
- sheets 1/7-7/7 as originally filed/furnished
  - pages\* received by this Authority on with the letter of
  - pages\* received by this Authority on with the letter of
- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to the sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to the sequence listing (*specify*):

\* If item 4 applies, some or all of those sheets may be marked "superseded."

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims 1-51	YES
	Claims	NO
Inventive step (IS)	Claims 1-51	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-51	YES
	Claims	NO

**2. Citations and explanations (Rule 70.7)**

The following documents identified in the International Search Report have been considered for the purposes of this report:

D1: US 2004/0055892

D2: WO2003/062456

D3: M. STEWARD ET AL. "NANOXEROGRAPHY: THE USE OF ELECTROSTATIC FORCES TO PATTERN NANOPARTICLES", Proceedings of the 2003 NSF Design Service and Manufacturing Grantees and Research Conference, Birmingham, Alabama, 6-9 January 2003, p.1-7.

D4: Derwent Abstract Accession No.92-154370/19, Class S06,

JP 04-086602 A (TOPPAN PRINTING CO LTD) 19 March 1992

Document D1 discloses the patterned electrophoretic deposition of nanostructure materials onto the substrate covered by mask. Electrode is attached to the areas not covered by mask and the direct (or alternating) field is applied onto the substrate causing the nanoparticles to migrate and attach themselves to the substrate. Nanoparticles are initially prepared in either true solution or in suspension, i.e. there is not disclosure of emulsion.

Document D2 discloses fabrication method chips and arrays for analytical (bio)chemistry applications. A multielectrode chip lithographed in wafer with a number of polarisable electrodes is put into contact with solution or suspension of colloidal carrier particles (such as nanoparticles) having biochemical recognition element attached. Typical recognition elements are molecular tweezers, enzymes, antibodies, receptors oligonucleotides, etc. Potential is briefly applied to selected electrodes and the recognition elements are selectively deposited onto them. Typical carrier particles included are: colloidal gold, glass, latex, polyurethane or unspecified polymers.

Document D3 discloses the concept of nanoxerography. A high resolution charge pattern is generated in the electret film to which nanoparticles in the solution or suspension are attracted. Particles are electrostatically assembled into a spatial pattern. The use of nanoxerography is suggested in the area of electron/photon devices, high-density data storage, protein recognition, DNA hybridisation etc.

**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of: V

Document D4 discloses the production of a colour filter by electrophotographic process. An electrostatic pattern is generated onto the electrophotographic sensitive body. A liquid developer, consisting of coloured resin dispersed in the carrier liquid, is then applied to produce desired pattern of pixels. Document does not specify the type of dispersion

In each of the documents D1-D4 particles are present either in the (true) solution or in the suspension. There is no disclosure of the use of emulsions, which are clearly different colloid systems from suspensions. This is valid well into the nanometre region.

**NOVELTY AND INVENTIVE STEP – CLAIMS 1-51**

In light of the above observation it is concluded:

The subject matter of claims 1-51 is new and meets the requirements of Article 33(2) PCT with regard to novelty. The claimed invention is not obvious in the light of any of the cited documents nor is it disclosed in any obvious combination of them. It is also considered that it would not be obvious to a person skilled in the art in the light of common general knowledge either by itself or in combination with any of these documents. Therefore the subject matter of these claims meets the requirements of Article 33(3) PCT with regard to inventive step.

**INDUSTRIAL APPLICABILITY CLAIMS 1-51**

Invention defined in claims 1-51 is industrially applicable.

31. A method as in Claim 30 wherein the support is selected from the group comprising metal, glass, ceramic, or polymeric material
32. A method as in Claim 30 wherein the conductive layer is selected from the group comprising a sputtered layer of metal, indium tin oxide, or salts such as quaternary ammonium salts.
33. A method as in Claim 30 wherein the dielectric or photoconductor layer is selected from the group comprising glass, a polymeric resin such as Mylar (PET, polyethyleneterephthalate), zinc oxide, cadmium sulphide, amorphous selenium, alloys of selenium such as selenium-tellurium, lead selenide, selenium-arsenic and polyvinylcarbazole (PVK).
34. A method of manufacturing a flat screen display of the type having separately illuminable pixels, the method including the steps of;
- i) providing a substrate having a light emitting diode array defining a plurality of pixel sites, each pixel site including an electrode;
  - ii) applying an electric charge to the electrodes of selected pixel sites,
  - iii) providing a liquid composition adapted to apply a colourant, the liquid composition including an insulative liquid and electrically charged colourant of a selected colour, wherein the colourant is or is incorporated in charged droplets comprising the discontinuous phase of an emulsion;
  - iv) placing the liquid composition onto the substrate;
  - v) attracting the colourant to the selected pixel sites;
  - vi) removing excess liquid composition from the substrate;
  - vii) fixing the colourant to the substrate; and
  - viii) repeating steps ii) to viii) to apply further colourant of other selected colours to other selected pixel sites.
35. A method of manufacturing a flat screen display as in Claim 34 wherein the selected colour includes the colours red, green and blue.

36. A method of manufacturing a flat screen display as in Claim 34 wherein the charge is applied to the selected pixel sites by activating selected ones of the LED array.

5 37. A method of manufacturing a flat screen display as in Claim 34 wherein the light emitting diodes may be organic light emitting diodes.

38. A method of manufacturing a flat screen display as in Claim 34 wherein the insulative liquid is selected from hydrocarbon fluids, silicone fluids, chlorinated  
10 hydrocarbons and perfluorocarbons.

39. A method of manufacturing a flat screen display as in Claim 34 wherein the substrate may be selected from glass, polyester foil, polycarbonate, Mylar™, stainless steel and the like.

15 40. A method of manufacturing a flat screen display as in Claim 34 wherein the substrate includes a coating of indium tin oxide (ITO).

41. A method of manufacturing a flat screen display of the type having separately  
20 illuminable pixels,

the method including the steps of;

- i) providing a substrate having a conductor array defining a plurality of pixel sites, each pixel site including an electrode;
- ii) applying an electric charge to the electrodes of selected pixel sites,
- 25 iii) providing a liquid composition adapted to apply a selected polymer film to the selected pixel sites, the liquid composition comprising an emulsion including a continuous phase comprising an insulative liquid and a discontinuous phase comprising electrically charged droplets of or including a polymer to deposit the polymer film;
- 30 iv) placing the liquid composition onto the substrate;
- v) attracting the droplets to the selected pixel sites;
- vi) removing excess liquid composition from the substrate;

vii) fixing the polymer to the substrate; and  
viii) repeating steps ii) to viii) to apply further selected polymer film to other selected pixel sites.

5     42.     A method of manufacturing a flat screen display as in Claim 41 wherein the polymer is a material which exhibits electroluminescence selected from the group comprising poly(phenylene vinylene) (PPV), parylene, polyvinylcarbazole (PVK) and polyfluorene.

10     43     A method of manufacturing a flat screen of display the type having separately illuminable pixels, the method including the steps of;

- i)     providing a substrate having a conductor array defining a plurality of pixel sites, each pixel site including an electrode;
- ii)     applying an electric charge to all of the electrodes of the plurality of pixel sites,
- 15     iii) providing a liquid composition adapted to apply a selected polymer film to the selected pixel sites, the liquid composition comprising an emulsion including a continuous phase comprising an insulative liquid and a discontinuous phase comprising electrically charged droplets of or including a polymer to deposit the polymer film;
- 20     iv) placing the liquid composition onto the substrate;
- v)     attracting the charged droplets to the selected pixel sites;
- vi)     removing excess liquid composition from the substrate;
- vii)     fixing the polymer to the substrate;
- viii)     applying an electric charge to selected ones of the electrodes of the plurality of
- 25     pixel sites,
- ix)     providing a second liquid composition adapted to apply a dye to the selected ones of the pixel sites, the liquid composition comprising an emulsion including a continuous phase comprising an insulative liquid and a discontinuous phase comprising electrically charged droplets of or including the dye to deposit onto the
- 30     polymer film;
- x)     placing the second liquid composition onto the substrate;
- xi)     attracting the charged droplets to the selected pixel sites;

- xii) removing excess liquid composition from the substrate;
- xiii) fixing the polymer to the substrate; and
- xiv) repeating steps viii) to xiii) to apply further selected dye to other selected pixel sites.

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44. A method of manufacturing a flat screen display as in Claim 43 wherein the polymer film fixed to the substrate is a photoconductor and step ix) is achieved by selective illumination of pixel sites.

10 45 A method of manufacturing a flat screen of display the type having separately illuminable pixels, the method including the steps of;

- i) defining a plurality of pixel sites on a substrate by generating a electrostatic array pattern on the substrate;
- ii) providing a liquid composition adapted to apply a selected polymer film to the
- 15 defined pixel sites, the liquid composition comprising an emulsion including a continuous phase comprising an insulative liquid and a discontinuous phase comprising electrically charged droplets of or including a polymer to deposit the polymer film;
- iii) placing the liquid composition onto the substrate;
- 20 iv) attracting the droplets to the defined the plurality of pixel sites;
- v) removing excess liquid composition from the substrate;
- vi) fixing the polymer to the substrate; and
- vii) repeating steps i) to vi) to apply further selected polymer film to other defined pixel sites.

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46. A flat screen display panel formed by the method of Claim 34.

47. A flat screen display panel formed by the method of Claim 41.

30 48. A flat screen display panel formed by the method of Claim 43.

49. A flat screen display panel formed by the method of Claim 45.



50. A DNA array on a substrate formed by the method of Claim 8.
51. A micrometre and nanometre scale spatially selective deposition of chemical  
5 substance on a substrate formed by the method of Claim 1.